WATER DIVERSION AND DISCHARGE POINTS ALONG THE MERCED RIVER: CRESSEY BRIDGE TO SAN JOAQUIN RIVER

California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road
Sacramento, CA 95827-3098

April 1989

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Board Members

Paul E. Simpson, Chair
Clifford C. Wisdom, Vice Chair
Karen Vercruse
John S. Corkins
Hugh V. Johns
W. Steve Tompkins
W. M. "Walt" Winn

William H. Crooks, Executive Officer

The staff involved in the
preparation of this report are:

Edward W. James, Engineering Geologist
Dennis W. Westcot, Senior Land and Water Use Analyst
Brenda J. Grewell, Associate Land and Water Use Analyst

Special thanks goes to the land owners, without whose cooperation this program would not have been possible.

TABLE OF CONTENTS

LIST OF FIGURES

SUMMARY

Little information is available on the extent and magnitude of diversions of water from the Merced River. Discharges from agricultural and other nonpoint sources are also poorly documented. To develop the data that is needed to establish beneficial uses and water quality objectives on the San Joaquin and Merced Rivers, a study was conducted in 1986 to gain information on the hydrologic influences on the Merced River. A 28-mile section of the Merced River was surveyed from the gaging station at the Cressey Bridge to the river mouth at the San Joaquin River. This section of the Merced River has 14 discharge points with the most significant three occurring from irrigation district operational spills. There are 49 points of water diversion for beneficial use within the 28-mile section of river studied. The largest number of diversion points occur in the river section from the Stevinson Bridge at Lander Avenue to the Highway 99 Bridge. The intensity of water diversion points is nearly twice that of the Stanislaus River (James, et al., 1989b) and is equaled on the San Joaquin River only in the reach downstream of the Stanislaus River inflow (James, et al., 1989a).

INTRODUCTION

The State Water Resources Control Board hearings on the problems at Kesterson Reservoir identified the need to control the discharges of agricultural subsurface drainage into the San Joaquin River and its tributaries. The main east side tributaries are the Stanislaus, Tuolumne and Merced Rivers. Programs on the federal, State and local levels have been initiated to investigate the impacts this agricultural drainage may be having on the beneficial uses in the San Joaquin River and its tributaries. The Central Valley Regional Water Quality Control Board (Regional Board) has the primary responsibility for regulating the discharge of drainage water. As part of the development of this regulatory program, the Regional Board intensified monitoring of agricultural discharges including gathering data on the geographic distribution of sources of discharge and users of San Joaquin, Stanislaus, Tuolumne and Merced River water.

The majority of the subsurface agricultural drainage pollutant load is discharged to the San Joaquin River via Mud Slough (north) and Salt Slough in Merced County (James et al., 1988a and 1988b). The impact of these discharges, however, is highly modified by numerous diversions and discharges up and down stream of these two sloughs. The importance of these other discharges and diversions is manifested by the finding that the majority of the river in many months of the year is made up entirely of agricultural return flows, both surface and subsurface. Little information is available on the extent and magnitude of the diversion and discharge points along the San Joaquin River and its three major east side tributaries. These east side tributaries play a key role in downstream water quality (James et al., 1988a). A recent water quality assessment showed that discharges and diversions in the Merced River play a key role in water quality downstream (Sorenson, 1982).

This study was initiated to gain information about the hydrology of the Merced River as it relates to agricultural water use and inflows to the San Joaquin River. The objective of the study was to physically characterize the Merced River from the Cressey Bridge to its inflow to the San Joaquin River by identifying the surface hydrologic influences on it. The goals were: a) to develop information that could be used in identifying the beneficial uses and appropriate water quality objectives for both the San Joaquin and Merced Rivers;

b) to identify the need for regulatory actions; and c) to provide a data base for the flow model being developed for the San Joaquin River. A similar discharge and diversion survey has been conducted for the San Joaquin River downstream of the Merced River inflow (James, et al. 1989a).

STUDY AREA

The study area consists of the 28-mile section of the Merced River extending from the gaging station at the bridge at Cressey to its mouth where it flows into the San Joaquin River. Due to major differences in the intensity of use along its length, the river was divided into three segments for analysis in this study. The first river segment chosen is from the gaging station at the Cressey Bridge to the Bridge at Highway 99. The second section is from the Highway 99 Bridge to the Stevinson Bridge at Lander Avenue (Highway 165). The third and final section is from the Stevinson Bridge to the Merced River inflow to the San Joaquin River. The river segments are shown in Figures 1 through 5. The river miles shown throughout this report are those used on the U.S. Geological Survey (USGS) 7.5 minute series quadrangles.

STUDY METHODS

The study was initiated in February 1986 with all field work completed by end of the summer 1987. The initial river survey was by air in February 1986. Additional information was obtained from USGS Topographical Survey Maps, Merced and Turlock Irrigation District Records, and Regional Board files. This was followed by an on-the-ground inspection of the entire length of the Merced River.

The on-the-ground survey of the Merced River consisted of traveling its entire length, noting the location and type of all discharges and diversions. In addition, the source of the discharge was identified. Detailed photographs of each site are available in the Regional Board files.

RESULTS

The river segment discussion that follows will describe the discharge and diversion data from east to west or upstream to downstream. The river miles are assigned, however, from the lowest miles downstream to the highest values upstream (denotes miles from the River terminus). This discussion will present a summary of each river segment. Each river segment identifies each site by a unique site number and locates the site along the Merced River. The unique site number assigned to each site describes the site location. For example, site #MRN00.5D; the first two letters describe the site as being on the Merced River (MR) while the next letter describes whether the site is on the north (N) or south (S) side of the river. The three-digit numeric designation (00.5) describes the river miles as defined by the USGS Maps. The final letter designation describes whether the site is a discharge (D) to the river or a diversion (P) from the river. The location of each discharge and diversion site is shown on Figures 1-5 and all discharge and diversion sites are listed in Table 1. Flow in the Merced River is highly regulated and strongly influenced by discharges or diversions within the study area. The 28-mile section of the Merced River surveyed in this study has 14 discharge points. All but four of these are tail water drains that serve localized small areas and only flow water when the fields are being irrigated. The remaining four; Stevinson Water District Drain (MRS01.7D), Turlock Irrigation District Faith Home Road Canal Spill (MRN04.9D), Merced Irrigation District Garibaldi Lateral Spill (MRS16.6D),

and the Merced Irrigation District Livingston Canal Spill (MRS21.7D) consist primarily of good quality operational spills from irrigation district canals. These latter four contribute a significant flow to the Merced River during the irrigation season.

The 28-mile section of the Merced River has 49 water diversion points for beneficial use. These are scattered throughout the entire 28-mile river section. The sites are equally divided between the north and south bank of the river; however, in the upper river section (Highway 99 to the Cressey Bridge) a high number of diversion sites occur along the northern bank. In the lowest river section (mouth to the Stevinson Bridge), the opposite is true, a higher number of sites occurring along the southern bank.

The density of diversion points along the entire 28-mile river section studied is nearly twice that found along the Stanislaus River (James, et al., 1989b) and this density is only found along the San Joaquin River downstream of Vernalis (James, et al., 1989a). The discussion that follows will briefly describe the significant surface hydrological influences on the Merced River within the three river segments. Each segment description is supported by a schematic flow diagram showing the site number.

RIVER SECTIONS

River Section 1 - Gaging Station at Cressey Bridge to Highway 99 Bridge

This 7-mile section of the Merced River has 11 diversion pumps, 9 of which are on the north bank. The majority of the diversion pumps serve irrigated land within the river flood plain or immediately adjacent to it. There are 4 discharge points, 3 of which are small field drains along the north bank. The remaining discharge can carry significant flows and results from operational spillage from the Livingston Canal operated by the Merced Irrigation District (MRS21.7D). A flow schematic of this river section is presented in Figure 6.

River Section 2 - Highway 99 Bridge to Stevinson Bridge

This 9.1-mile section of the Merced River has 22 diversion pumps, approximately equally divided between the north and south banks. The pumps on the south bank tended to be larger capacity pumps and appeared to supplement water supplies to large tracts of land. This section of the river has the highest density of diversion pumps within the study area. The density of diversion points in this river section is over twice that of the Stanislaus River (James, et al., 1989b). There are 4 discharge points, 3 of which are small field drains. The remaining discharge site can carry significant flow and results from operational spillage from the Garibaldi Lateral Canal operated by the Merced Irrigation (MRS16.6D). A flow schematic of this river section is presented in Figure 7.

River Section 3 - Stevinson Bridge to San Joaquin River

This 11.5 mile section of the Merced River has 16 diversion pumps with all but 5 of these occurring on the southern bank. The pumps along the south bank were larger and many were owned and operated by the Stevinson Water District or the Gallo Ranch. The south bank pumps appeared to supplement water supplies to large tracts of irrigated land. There are 6 discharge points, 4 of which are from smaller field drains. One of the remaining discharges is an operational spill from Turlock Irrigation District's Faith Home Road Canal (Lateral 8) (MRN04.9D).

The other discharge is a tile drainage discharge from 160 acres of land within the Turlock Irrigation district (MRN11.OD). A flow schematic of this river reach is presented in Figure 8.

REFERENCES

James, E.W., Grewell, B.J., Westcot, D.W., Belden, K.K. and Boyd, T.F., 1988a. Water Quality of the Lower San Joaquin River: Lander Avenue to Vernalis, May 1985 to March 1988. Central Valley Regional Water Quality Control Board Report. 95 pages.

James, E.W., Westcot, D.W., Grewell, B.J., Belden, K.K., Boyd, T.F., Waters, R.I., and Thomasson, R.R., 1988b. Agricultural Drainage Contribution to Water Quality in the Grassland Area of Western Merced County, California. Central Valley Regional Water Quality Control Board Report, 169 pages.

James, E.W., Westcot, D.W. and Gonzalez, J.L., 1989a. Water Diversion and Discharge Points Along the San Joaquin River: Mendota Pool Dam to Mossdale Bridge. Central Valley Regional Water Quality Control Board Report. 2 Volumes

James, E.W., Westcot, D.W. and Gonzalez, J.L., 1989b. Water Diversion and Discharge Points Along the Stanislaus River: Highway 99 Bridge to San Joaquin River. Central Valley Regional Water Quality Control Board Report, 26 pages.

Sorenson, S.K., 1982. Water-Quality Assessment of the Merced River, California. U.S. Geological Survey Open-File Report 82-450, 46 pages and maps.

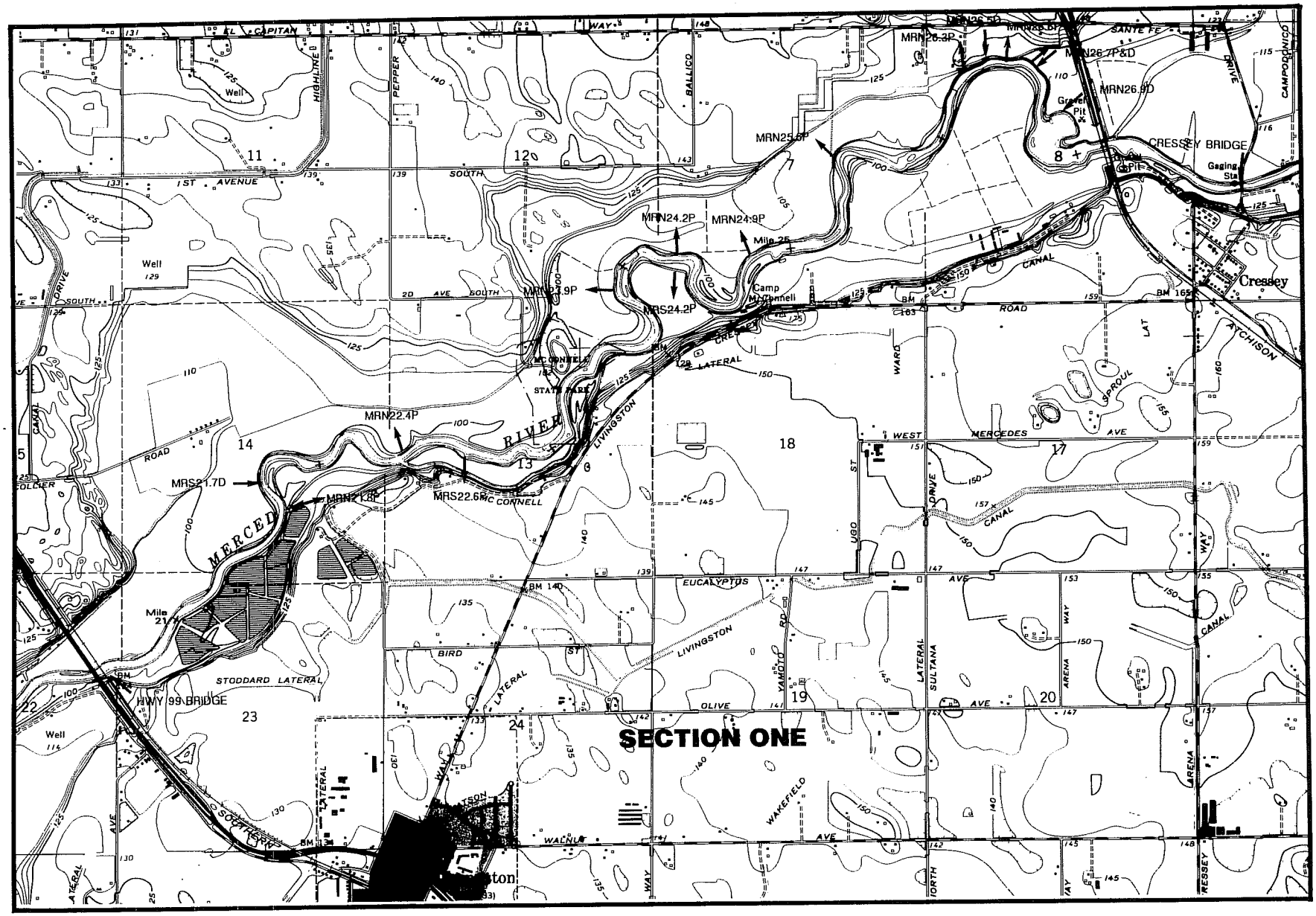

Figure 1 Diversion and Discharge Sites Along the Merced River from the Gage at Cressey Bridge to Highway 99

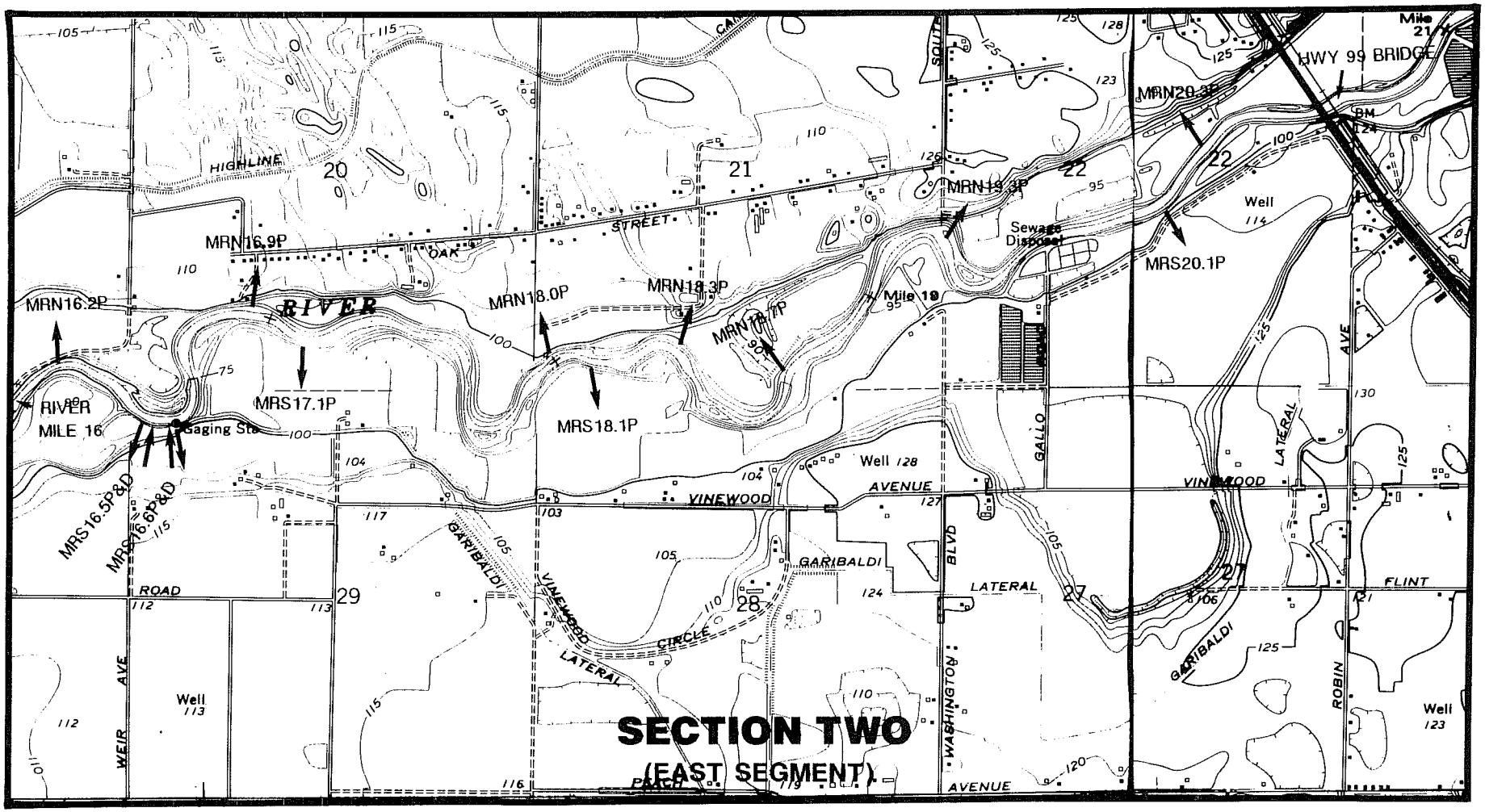

Figure 2 Diversion and Discharge Sites Along the Merced River from Highway 99 to Stevinson Bridge (East Segment)

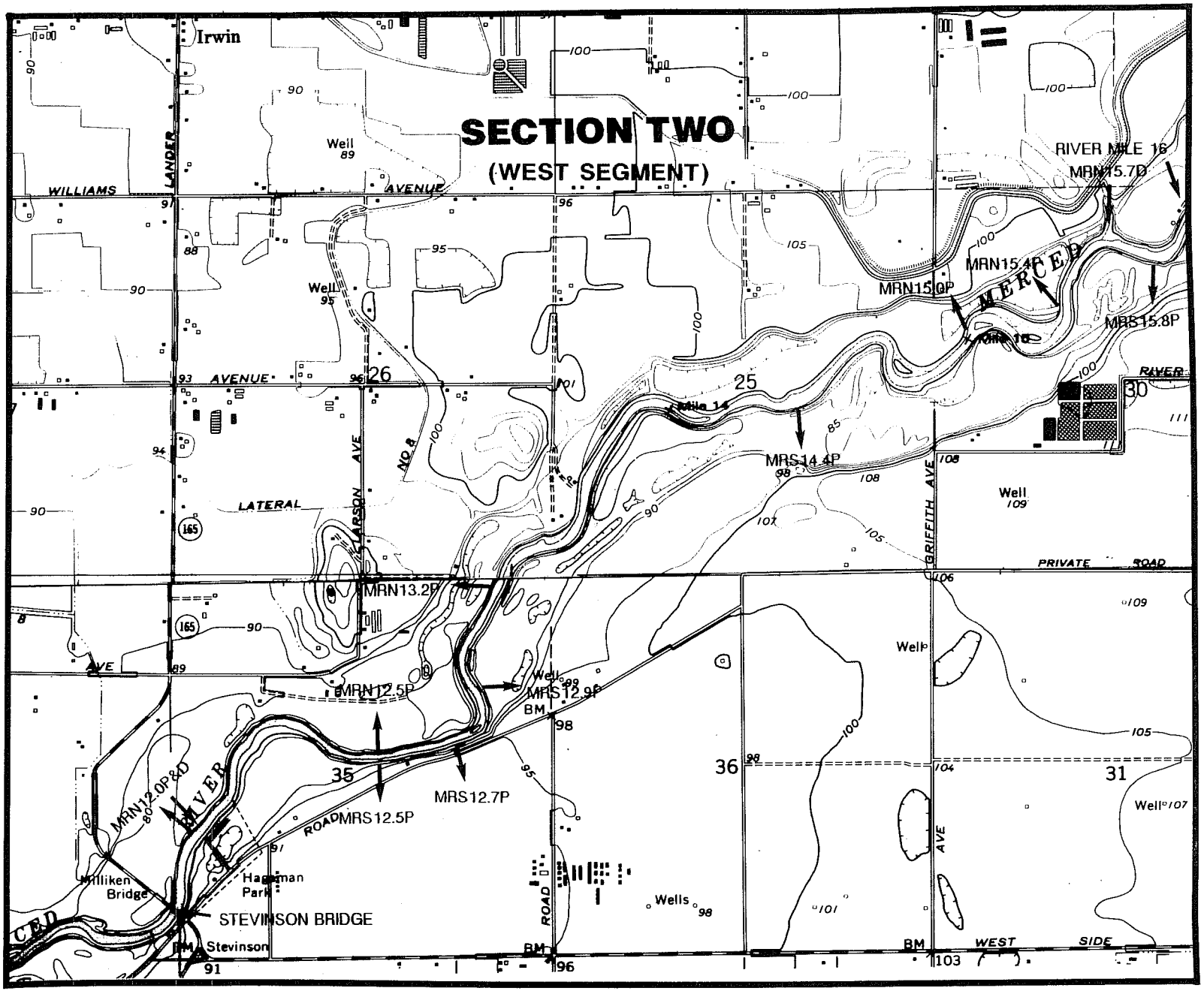

Figure 3 Diversion and Discharge Sites Along the Merced River from Highway 99 to Stevinson Bridge (West Segment)

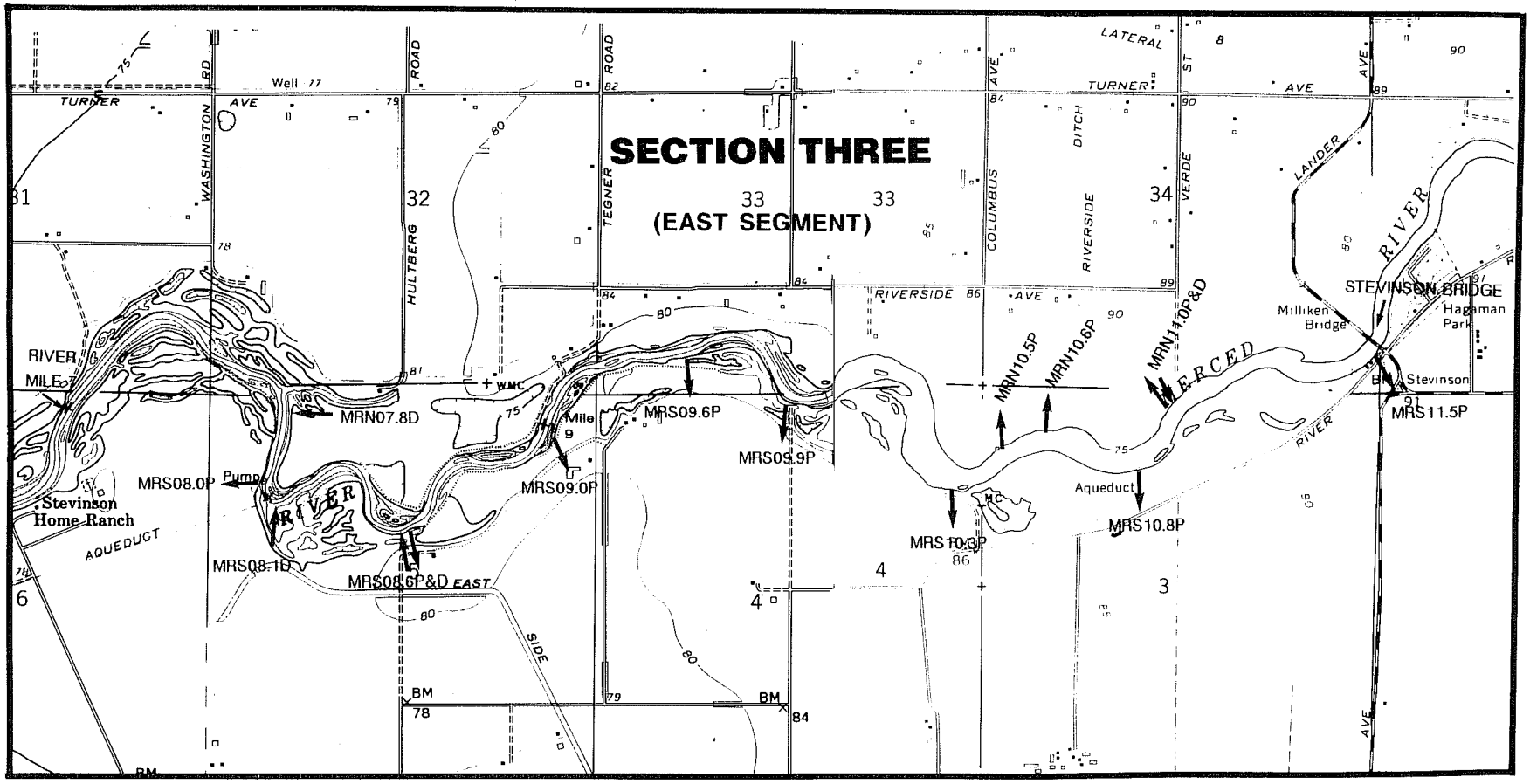

Figure 4 Diversion and Discharge Sites Along the Merced River from the Stevinson Bridge to the San Joaquin River (East Segment)

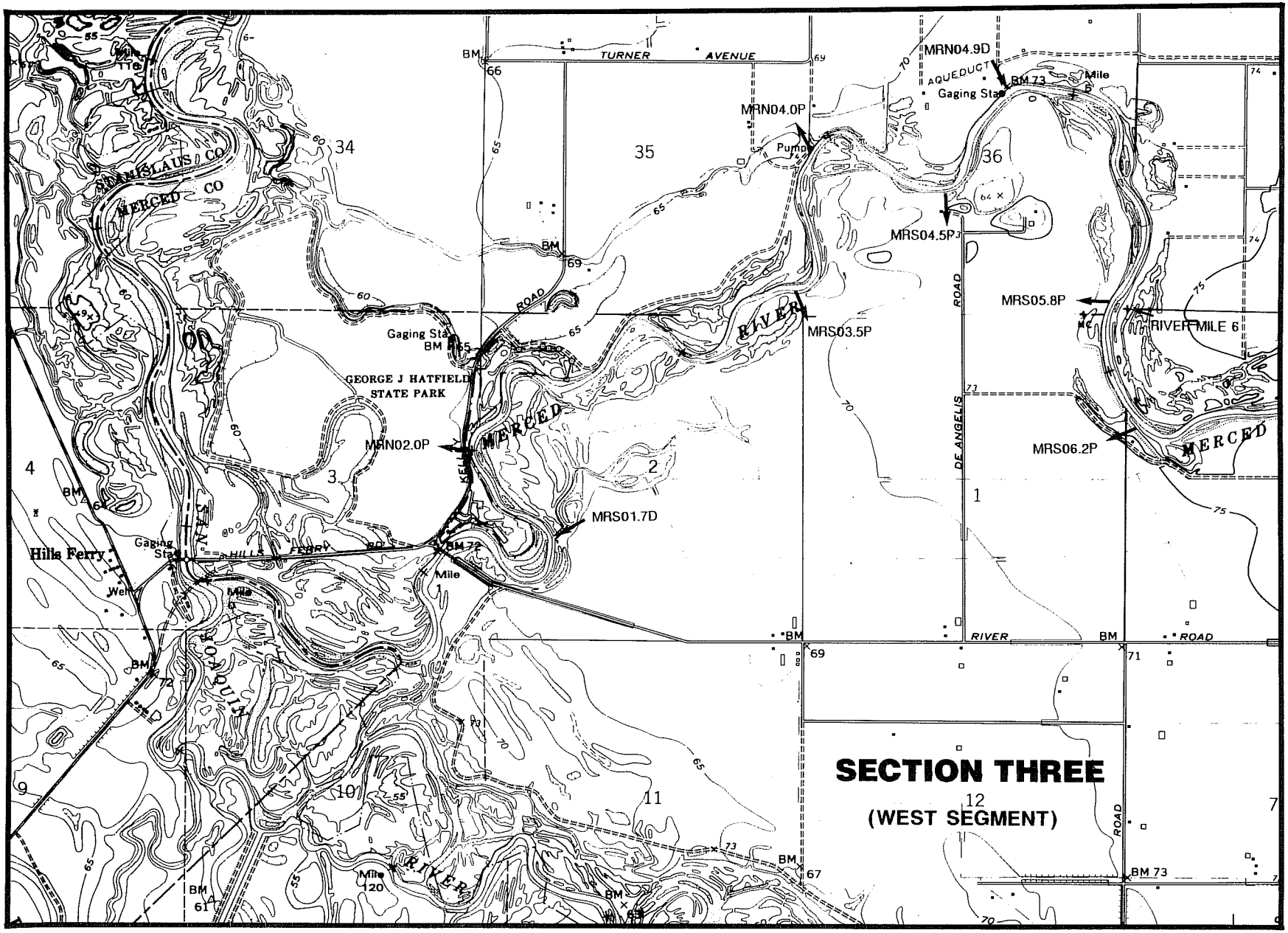

Figure 5 Diversion and Discharge Sites Along the Merced River from the Stevinson Bridge to the San Joaquin River (West Segment)

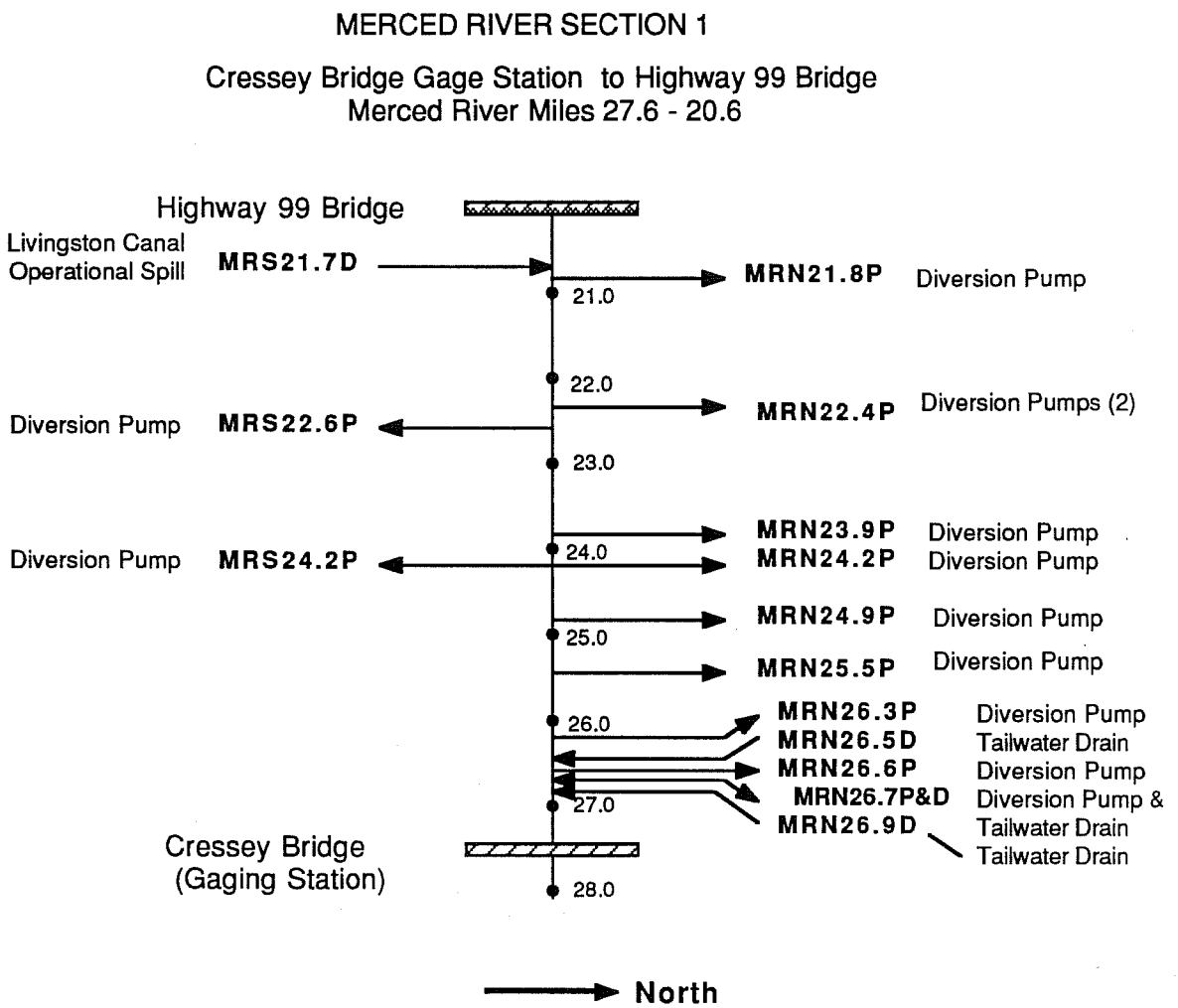

Figure 6 Schematic Diagram for Water Diversions and Discharges on the Merced River from the Gaging Station at the Cressey Bridge to the Highway 99 Bridge (River Section 1).

MERCED RIVER SECTION 2

Highway 99 Bridge to Stevinson Bridge (Hwy. 165)
Merced River Miles 20.6 - 11.5

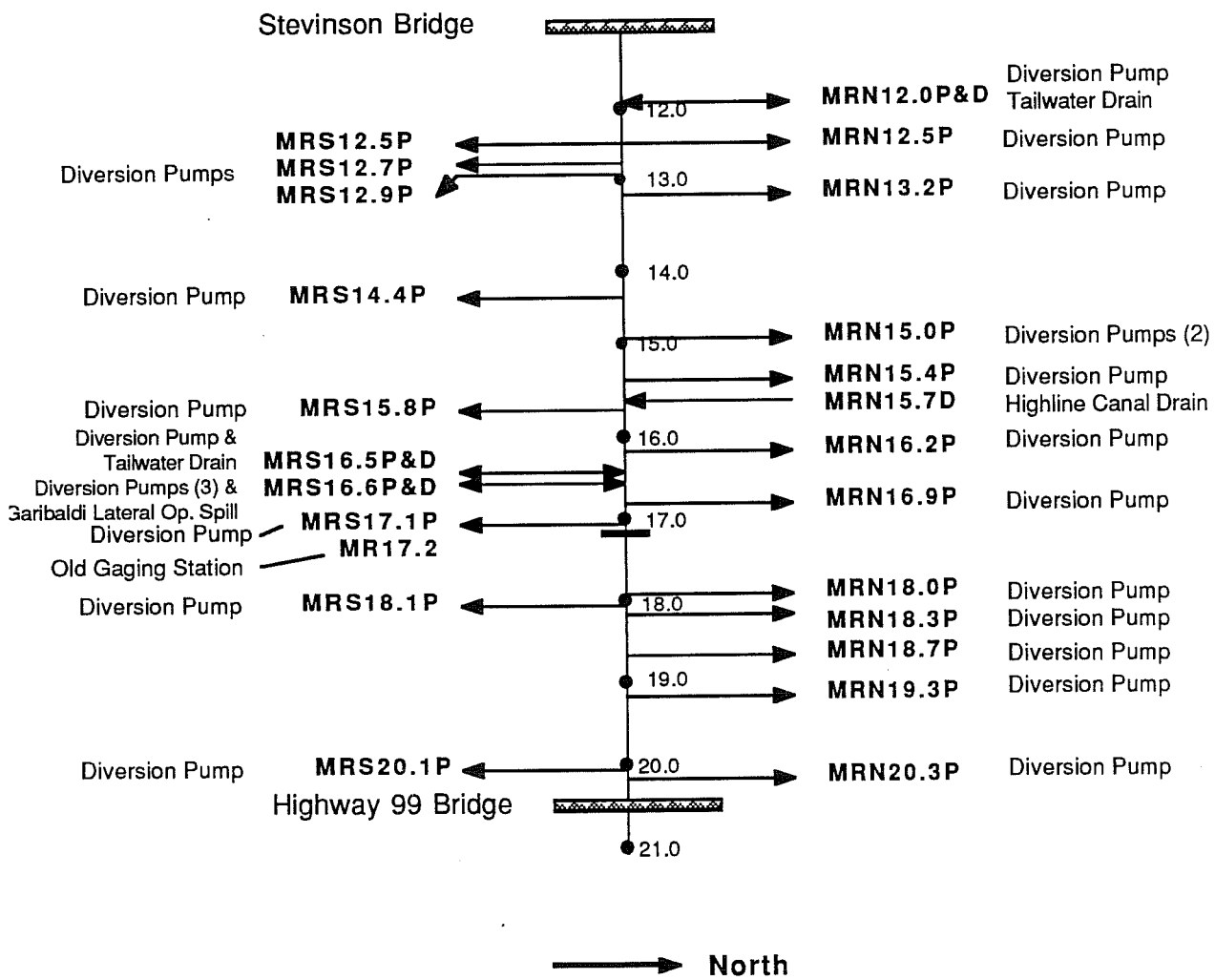

Figure 7 Schematic Diagram for Water Diversions and Discharges on the Merced River from Highway 99 Bridge to Stevinson Bridge (River Section 2)

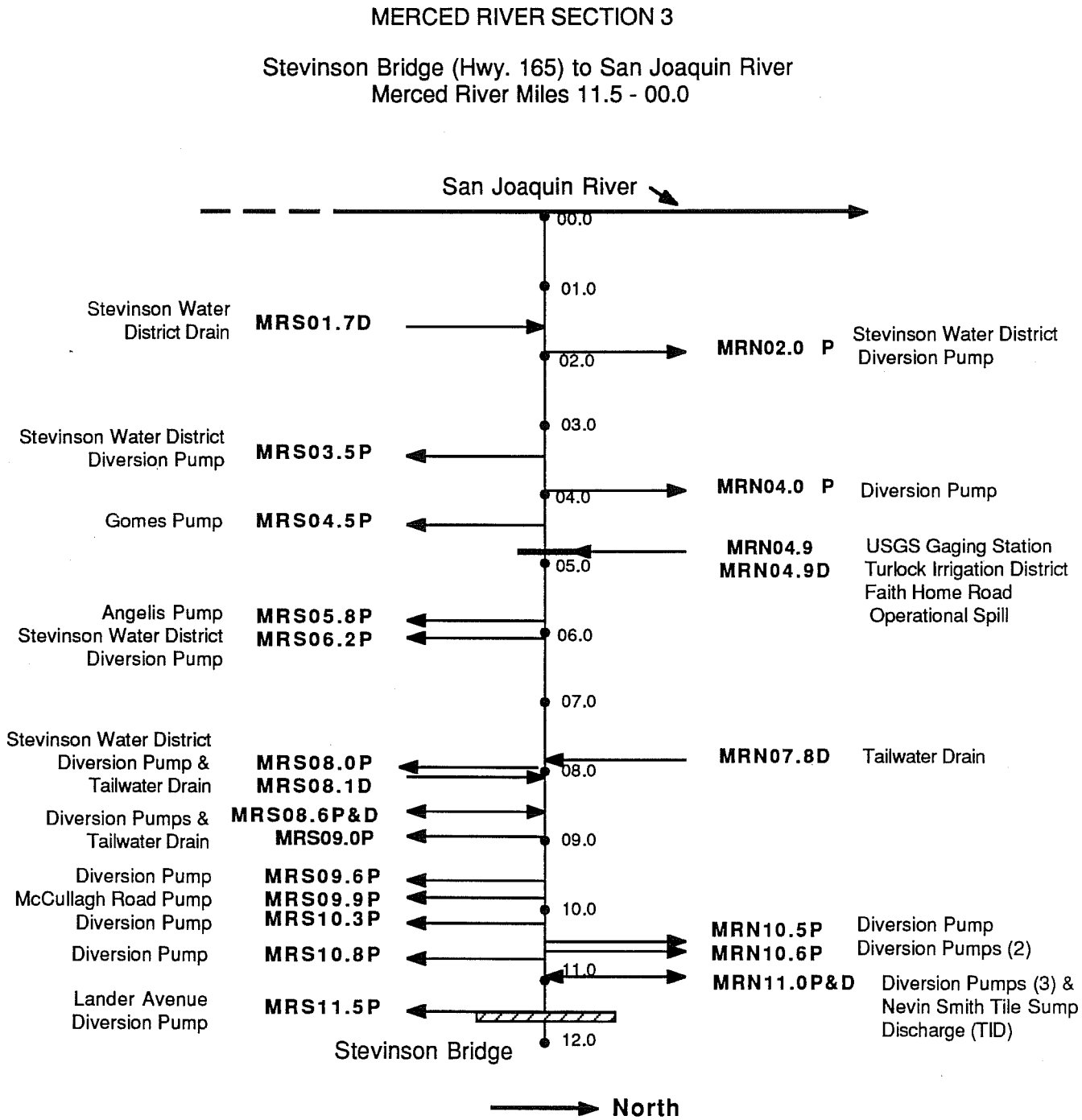

Figure 8 Schematic Diagram for Water Diversions and Discharges on the Merced River from Stevinson Bridge to the San Joaquin River (River Section 3)

Table 1 Water Discharge and Diversion Sites Along the Merced River from the San Joaquin River to the Gage at Cressey Bridge

Site #	River Mileage	Bank	Type of Facility
	00.0	--	Merced River Inflow to San Joaquin River
1	01.7	South	Stevinson Water District Drain
2	02.0	North	Diversion Pump (Stevinson Water District)
3	03.5	South	Diversion Pump (Stevinson Water District)
4	04.0	North	Diversion Pump
5	04.5	South	Gomes Pump
	04.9	North	USGS Gaging Station
6	04.9	North	Turlock Irrigation District Faith Home Road Operational Spill
7	05.8	South	Angelis Pump
8	06.2	South	Stevinson Water District Diversion Pump
9	07.8	North	Tailwater Drain
10	08.0	South	Stevinson Water District Diversion Pump
11	08.1	South	Stevinson Water District Diversion Pump
12	08.6	South	Tailwater Drain
13	08.6	South	Diversion Pump
14	09.0	South	Diversion Pump
15	09.6	South	Diversion Pump
16	09.9	South	McCullogh Road Pump
17	10.3	South	Diversion Pump
18	10.5	North	Diversion Pump
19	10.6	North	Diversion Pumps (2)
20	10.8	South	Diversion Pump
21	11.0	North	Diversion Pumps (3)
22	11.0	North	Nevin Smith Tile Sump Discharge (TID)
23	11.5	South	Lander Avenue Diversion Pumps
	11.5	--	Stevinson Bridge
24	12.0	North	Tailwater Drain
25	12.0	North	Diversion Pump
26	12.5	North	Diversion Pump
27	12.5	South	Diversion Pump
28	12.7	South	Diversion Pump
29	12.9	South	Diversion Pump
30	13.2	North	Stavrianoudakis Diversion Pump (2)
31	14.4	South	Diversion Pump
32	15.0	North	Rocha Dairy Diversion Pumps (2)
33	15.4	North	Diversion Pump
34	15.7	North	Highline Canal Drain
35	15.8	South	Diversion Pump
36	16.2	North	Diversion Pump
37	16.5	South	Tailwater Drain
38	16.5	South	Diversion Pump
39	16.6	South	Operational Spill-Garibaldi Lateral
40	16.6	South	Diversion Pumps (3)
41	16.9	North	Diversion Pump
42	17.1	South	Diversion Pump
	17.2	South	Old Gaging Station

Table 1 (continued)

Site #	River Mileage	Bank	Type of Facility
43	18.0	North	Diversion Pump
44	18.1	South	Diversion Pump
45	18.3	North	Diversion Pump
46	18.7	North	Diversion Pump
47	19.3	North	Diversion Pump
48	20.1	South	Diversion Pump
49	20.3	North	Diversion Pump
	20.6	--	Highway 99 Bridge
50	21.7	South	Livingston Canal Operational Spill
51	21.8	North	Diversion Pump
52	22.4	North	Diversion Pumps (2)
53	22.6	South	Diversion Pump
54	23.9	North	Diversion Pump
55	24.2	North	Diversion Pump
56	24.2	South	Diversion Pump
57	24.9	North	Diversion Pump
58	25.5	North	Diversion Pump
59	26.3	North	Diversion Pump
60	26.5	North	Tailwater Drain
61	26.6	North	Diversion Pump
62	26.7	North	Tailwater Drain
63	26.7	North	Diversion Pump
64	26.9	North	Tailwater Drain
	27.6	--	Cressey Bridge Gage Station